

Claims

1. Apparatus for delivering fluid to a biochip, the apparatus comprising:

one or more fluid circuits, each comprising:

a first fluid conduit for delivering fluid to a biochip cartridge;

5 a second fluid conduit for delivering fluid from the biochip cartridge;

a pump for propelling fluid through the circuits; and

a movable chip cartridge interface assembly comprising:

a chip cartridge guide;

a heating/cooling element; and

10 an inlet port and an outlet port;

wherein, when the chip cartridge interface is in the engaged position during use, the inlet port and outlet port are urged against the inlet conduit and outlet conduit respectively by a spring; and

further wherein the chip cartridge assembly is disengaged from the fluid conduits by
15 compression of the spring.

2. The apparatus of claim 1, further comprising:

a biochip cartridge comprising:

an inlet port for receiving the inlet conduit;

an outlet port for receiving the outlet conduit; and

20 a gasket seal adjacent each inlet port and each outlet port;

wherein when a chip is placed in the cartridge during use, the inlet port, outlet port and chip form a closed fluid loop.

3. The apparatus of claim 1, wherein the inlet conduit and the outlet conduit comprise probes configured to connect the inlet conduit to the inlet port and the outlet conduit to the outlet port when the chip cartridge assembly is in the engaged position.
4. The apparatus of claim 3, wherein the probes are stainless steel posts.
- 5 5. The apparatus of claim 2, wherein at least one of the gaskets includes a filter.
6. The apparatus of claim 5, wherein the filter is a stainless steel frit.
7. The apparatus of claim 1, wherein the first conduit and the second conduit are connected to a reversing valve effective to control the direction of flow of fluid across the biochip.
8. The apparatus of claim 1, where the spring is compressed by a motor to disengage the
10 chip cartridge assembly.
9. The apparatus of claim 8, wherein the motor is connected to a slotted link effective, when the motor is actuated, to move the biochip cartridge assembly against the force of the spring effective to disengage the chip cartridge from the inlet and outlet conduits.
10. The apparatus of claim 8, wherein the motor is a DC gear motor.
- 15 11. The apparatus of claim 1, further comprising an inductive proximity switch effective to detect the position of the chip cartridge assembly.
12. The apparatus of claim 1, further comprising one or more fluid reservoirs in fluid communication with the fluid circuits.
13. The apparatus of claim 1, wherein each fluid loop comprises a reservoir, and a reversing
20 valve.
14. The apparatus of claim 1, further comprising a sample holder tray with tube holders and outlet holes for connection of tubing to connect the fluid loops to tubes in the tube holders.

15. The apparatus of claim 1, comprising a master module, and a plurality of fluid loops for delivering fluid to a biochip cartridge and wherein the master module comprises a plurality of reservoirs each connected to a port of a first multiport valve and wherein each fluid loop is connected to a port of a second multiport valve such that fluid from any reservoir connected to
5 the first multiport valve may be delivered to any selected fluid loop.
16. The apparatus of claim 15, wherein each fluid loop comprises a three port valve configured such that fluid may be delivered to two biochip cartridges within each fluid loop.
17. The apparatus of claim 1, further comprising a computer for controlling the pump and heating/cooling element.
- 10 18. The apparatus of claim 17, further comprising a user interface connected to the computer.
19. A fluidics station comprising:
- a housing;
- one or more movable chip cartridge interface assemblies contained within the housing comprising:
- 15 a chip cartridge guide configured to hold two chip cartridges;
- a heating/cooling element; and
- an inlet port and an outlet port;
- a plurality of fluid circuits comprising tubing, valves, pumps, and fluid reservoirs configured to deliver fluids to and from the chip cartridges;
- 20 a processor to control the delivery of fluids to individual chips and to control the heating/cooling elements; and
- a user interface to input commands to the computer;

wherein each movable chip cartridge interface assembly is moveable from an engaged position to a disengaged position;

wherein in the engaged position the chip cartridge is pushed by a spring to engage the fluid circuits through ports in the chip cartridge, wherein each port contains a gasket and in
5 which the pressure of the spring compresses the gasket to form a seal with the fluid circuit;

and further wherein in the disengaged position the chip cartridge is separated from the fluid circuit by compression of the spring.

20. The fluidics station of claim 19, wherein each gasket contains a frit filter embedded in the gasket.

10 21. A biochip cartridge for processing a microarray on a biochip comprising:

an inlet port for receiving an inlet conduit of a fluidic circuit;

an outlet port for receiving an outlet conduit of a fluidic circuit; and

a gasket seal adjacent each inlet port and each outlet port;

wherein each gasket seal comprises a filter embedded in the gasket; and

15 further when a chip is placed in the cartridge during use, the inlet port, outlet port and chip form a closed fluid loop.